Name: _____

Date: _____ Class: _____

How Big is That Star?

Measuring Binary Stars

Summary

You are going to be measuring the sizes of stars in binary systems.

Background

Look at the sample light curves below. They show the brightness of a binary system as a function of time.

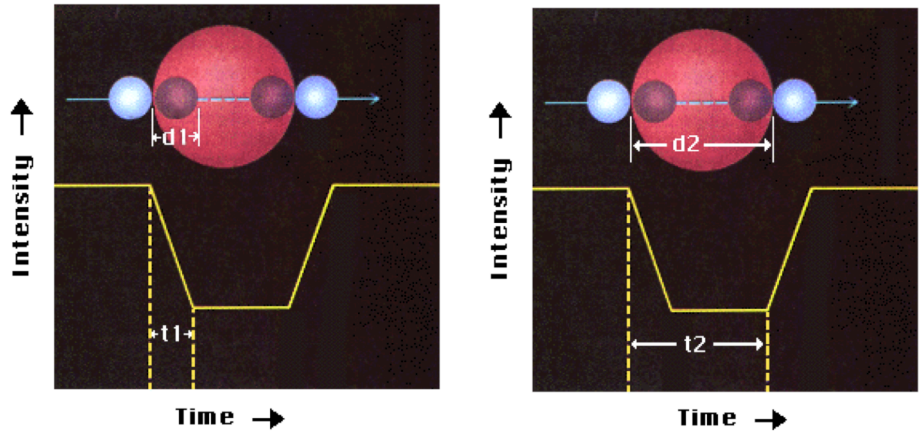

Illustration of the relationship between the dips in the light curve and the stars in a binary. The large red circle represents the larger star in the binary system and the smaller circles represent the smaller star as it moves through its orbit.

In a sentence, describe the relationship between t_1 and d_1. What does d_1 represent?

In a sentence, describe the relationship between t_2 and d_2. What does d_2 represent?

Using this information, data from real binary systems, and the equation $d=v \cdot t$ (distance equals velocity times time), you'll calculate the sizes of a few stars.

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H Cas

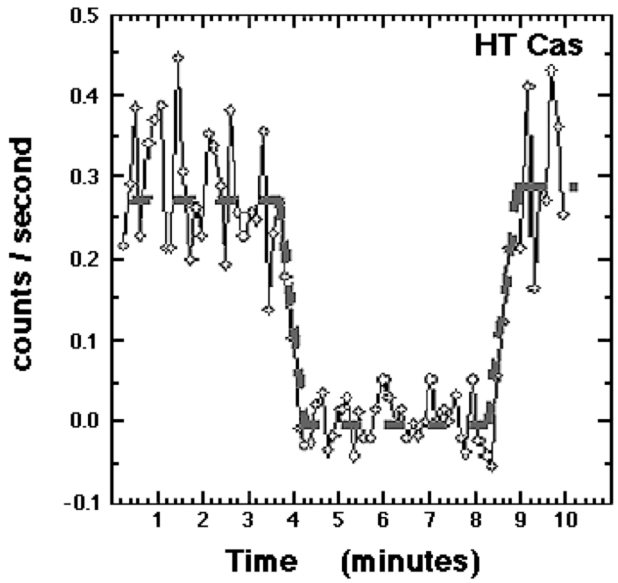
Work through this example along with your teacher.

Using the graph to the right, determine and record the following (be sure to include units):

t_1: _____

t_2: _____

The orbital velocity of HT Cas is known to be 390 km/sec.



Light curve for binary system HT Cas.

Using $d=v \cdot t$, determine the size of each star in HT Cas. Show your work below, or on additional paper, if you need more room.

Write the size of each star in HT Cas below (make sure to include units):

d_1: _____ d_2: _____

Name: _____

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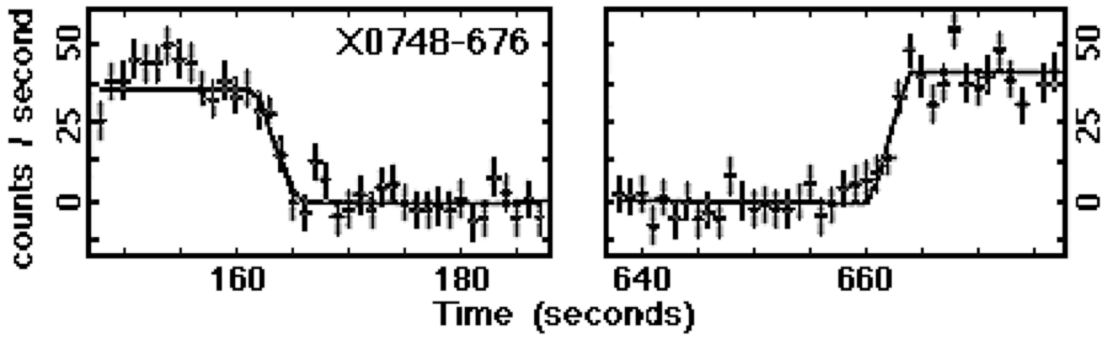
X0748-676



Light curve for binary system X0748-676. Note that the plot is cut in the middle, to make it fit. The missing middle section can assumed to be flat at about zero counts per second.

Using the graph above, determine and record the following (be sure to include units):

t_1: _____ t_2: _____

The orbital velocity of X0748-676 is known to be 500 km/sec.

Using $d=v \cdot t$, determine the size of each star in X0748-676. Show your work below, or on additional paper, if you need more room.

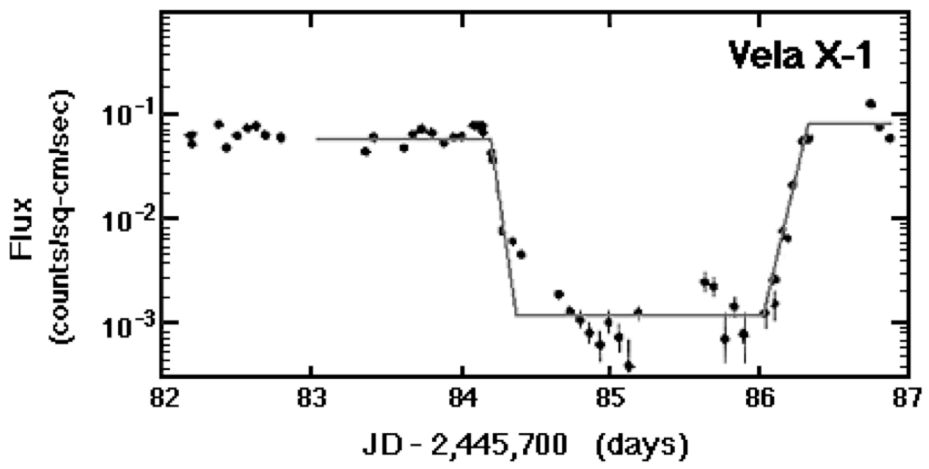
Write the size of each star in X0748-676 below (make sure to include units):

d_1: _____ d_2: _____

Name: _____

Date: _____ Class: _____

Vela X-1



Light curve for binary system Vela X-1.

Using the graph above, determine and record the following (be sure to include units):

t_1: _____ t_2: _____

The orbital velocity of Vela X-1 is known to be 280 km/sec.

Using $d=v \cdot t$, determine the size of each star in Vela X-1. Show your work below, or on additional paper, if you need more room.

Write the size of each star in Vela X-1 below (make sure to include units):

d_1: _____ d_2: _____